

REMARKS/ARGUMENTS

Status of Claims

Claims 1, 23, 24, 31, 46, 48, and 64 are hereby amended.

Claims 43, 45, 47, 52, and 53 are hereby canceled.

Thus, claims 1-3, 5-8, 11-24, 31, 38, 46, 48, and 54-68 are currently pending in this application.

Applicants hereby request further examination and reconsideration of the presently claimed application.

Claim Rejections – 35 U.S.C. §103

Claims 1-3, 5-8, 11-24, 31, 38, 43, 45-48, and 51-68 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Reagen* (U.S. Patent 5,376,612) in view of *Manzer* (U.S. Patent 4,057,565). Claims 43, 45-46, 52, and 53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Reagen* in view of *Furtek* (U.S. Patent 4,876,229). Claims 43, 45, 47, 52, and 53 are canceled, claims 2, 3, 5-8, 11-22, 38, and 54-58 depend on independent claim 1, claims 59-60 depend on independent claim 23, claims 61-62 depend on independent claim 24, claims 65-68 depend on independent claim 64, and claims 48 and 63 depend on independent claim 46. Thus, claims 1-3, 5-8, 11-24, 31, 38, 46, 48, and 54-68 stand or fall on the application of *Reagen* and *Manzer* to independent claims 1, 23, 24, 31, 46, and 64 and the application of *Reagen* and *Furtek* to independent claim 46.

The Applicants respectfully submit that *Reagen*, *Manzer*, and *Furtek* do not establish a *prima facie* case of obviousness as to the pending claims. According to MPEP § 2142, three basic criteria must be met to establish a *prima facie* case of obviousness:

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in

the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. **Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

Similarly, the fact that the Examiner has the burden of proof with respect to the elements of the *prima facie* case of obviousness is also well defined in MPEP § 2142:

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.

The Examiner has not met the burden of establishing the *prima facie* case of obviousness because *Reagen*, *Manzer*, and *Furtek* fail to teach or suggest methods of making catalysts having reduced corrosive compounds as recited in the pending claims.

I. Overview of Differences between the Pending Claims and the Cited Art

Various types of catalysts may be used to oligomerize and/or polymerize olefins. Chromium-containing catalysts are one example of such catalysts. Specifically, supported chromium oxide catalysts may be used to produce olefin polymers, such as polyethylene or copolymers of ethylene and hexene. Some of these catalysts may lack selectivity to a desired product and/or may have low productivity. *Reagen*, which is owned by the same assignee as the present application, addresses the low selectivity and productivity of certain chromium-containing catalysts.

Since *Reagen* was filed, the Applicants have continued to research and develop improved chromium-containing oligomerization and/or polymerization catalysts. As part of the research and development process, the Applicants discovered that corrosive compounds were still being created

during the catalyst creation process despite attempts to work with dry reactants. As described in paragraph 33 of the specification:

In embodiments to prepare a catalyst, one or more of the catalyst components may contain water, for example the composition comprising the chromium-containing compound. Water may be present in a catalyst compound, for example as a contaminant or as a co-product produced during the preparation of the catalyst compound. For example, water may be co-produced during preparation of the chromium-containing compound, and such water may complex with the chromium. Acidic protons may also be present, for example carboxylic acid (e.g., ethylhexanoic acid) remaining from production of the chromium-containing compound (e.g., chromium tris(2-ethylhexanoate)). This free water as well as acid present in the chromium source can subsequently react with a metal halide present in the catalyst, for example the metal alkyl halide such as DEAC, to form corrosive compounds, e.g. hydrogen halide compound (e.g. hydrochloric acid). Such compounds may cause corrosion in downstream equipment over time, in particular when heated, for example in downstream fractionation facilities. Accordingly, it may be desirable to abate water, acidic protons, or both, when making the catalyst to prevent downstream formation of potentially corrosive by-products.

As shown above, water may be produced during preparation of the catalyst compound and may complex with the chromium-containing compound. As such, when the metal halide is added to the chromium-containing compounds, corrosive compounds are created, which cause problems with downstream processing.

The present claims are directed to an addition sequences that prevent the formation of these corrosive compounds. Specifically, the Applicants determined that allowing the non-halide metal alkyl to interact with the chromium-containing compounds in the absence of the metal halide had an unexpected and significant effect on the formation of corrosive compounds. In fact, it was determined that the Applicants' addition sequence substantially reduced or eliminated the formation of the same corrosive compounds. The present application was directed, in part, to protect these improvements.

II. The Limitation Regarding Water, Acidic Protons, or Both in the Chromium-Containing Compound

Claims 1, 23, 24, 31, and 46 recite the limitation that water, acidic protons, or both are present in the chromium-containing compound, which is not taught or suggested by the cited prior art. More specifically, the independent claims recite:

Claim 1: **“wherein the composition comprising a chromium-containing compound further comprises acidic protons, water, or both . . . abating all or a portion of the water, acidic protons, or both from the composition comprising the chromium-containing compound by contact thereof with a non-halide metal alkyl prior to contact thereof with a composition comprising the metal halide-containing compound”**;

Claim 23: **“wherein the composition comprising a chromium-containing compound further comprises acidic protons, water, or both, and wherein water, acidic protons, or both are abated from the composition comprising the chromium-containing compound by contact thereof with a non-halide metal alkyl prior to bringing the mixed resultant solution into contact with the composition comprising the chromium-containing compound”**;

Claim 24: **“wherein the composition comprising a chromium-containing compound further comprises acidic protons, water, or both . . . wherein water, acidic protons, or both are abated from the composition comprising a chromium-containing compound by contact thereof with a non-halide metal alkyl prior to preparation of the catalyst”**;

Claim 31: **“a chromium source comprising acidic protons, water, or both . . . wherein water, acidic protons, or both are abated from the chromium source by contact thereof with a non-halide metal alkyl prior to formation of the catalyst”**; and

Claim 46: **“wherein the composition comprising a chromium-containing compound further comprises acidic protons, water, or both . . . abating all or a portion of water, acidic protons, or both from the composition comprising the chromium-containing compound prior to formation of the catalyst”**; and

As can be clearly seen from the claim limitations set forth above, claims 1, 23, 24, 31, and 46 recite the limitation that the chromium-containing compound contains water, acidic protons, or both. In contrast, *Reagen* teaches that the catalyst components are protected from picking up water (or picking up additional water) by placing the catalyst components in a drybox and contacting the

catalyst components in the drybox employing nitrogen or using airless glassware employing a vacuum or nitrogen (anhydrous conditions). See *Reagen*, col. 19, line 42 – col. 20, line 12. Handling the catalyst components and/or preparing the catalyst composition in a drybox employing nitrogen or using airless glassware employing a vacuum or nitrogen does not remove significant quantities of water from compositions containing water, acidic protons, or both. Additionally, handling the catalyst components and/or preparing the catalyst composition in the drybox employing nitrogen or using airless glassware employing a vacuum or nitrogen does not remove some forms of acidic protons (e.g. those from carboxylic acids). Furthermore, if the chromium-containing compounds of the compositions comprising the chromium containing compounds have been dried as alleged by the Examiner (but not admitted by the Applicants), the chromium-containing compounds do not contain water, acidic protons, or both. As such, *Reagen* would fail to teach or suggest a limitation in the claims. The Examiner does not cite *Manzer* or *Furtek* to teach or suggest that the chromium-containing compound contains water, acid protons, or both. Consequently, the cited prior art fails to teach or suggest the claimed presence of water, acidic protons, or both in the chromium-containing compound and the pending claims should be allowed.

III. The Addition Sequence Limitation

Each of the pending independent claims recites a specific addition sequence of the catalyst components that is not taught or suggested by the cited prior art. More specifically, the independent claims recite:

Claim 1: “abating all or a portion of the water, acidic protons, or both from the composition comprising the chromium-containing compound by contact thereof with a non-halide metal alkyl **prior to contact thereof** with a composition comprising the metal halide-containing compound”;

Claim 23: “wherein water, acidic protons, or both are abated from the composition comprising the chromium-containing compound **by contact thereof** with a non-

halide metal alkyl **prior to** bringing the mixed resultant solution into contact with the composition comprising the chromium-containing compound”;

Claim 24: “wherein water, acidic protons, or both are abated from the composition comprising a chromium-containing compound **by contact thereof** with a non-halide metal alkyl **prior to** preparation of the catalyst”;

Claim 31: “wherein water, acidic protons, or both are abated from the chromium source **by contact thereof** with a non-halide metal alkyl **prior to** formation of the catalyst”;

Claim 46: “abating all or a portion of water, acidic protons, or both from the composition comprising the chromium-containing compound **prior to** formation of the catalyst”; and

Claim 64: “abating all or a portion of the water, acidic protons, or both from the composition comprising the chromium-containing compound, a composition comprising the pyrrole-containing compound, or combinations thereof by contact thereof with a non-halide metal alkyl to form a mixture **prior to contact** of the mixture with a composition comprising the metal halide-containing compound.”

As can be clearly seen from the claim limitations set forth above, the independent claims recite a specific addition sequence wherein water, acidic protons, or both are abated from the catalyst components **prior to contact thereof** with a composition comprising the metal halide-containing compound. In contrast, col. 15, lines 5-11, of *Reagen* teaches that when the catalyst composition contains a halide-containing compound (as required by the pending claims) the chromium-containing compound is combined with the metal alkyl **subsequent to** the addition of the halide-containing compound to increase catalyst system productivity. The Examiner does not cite *Manzer* or *Furtek* to teach or suggest the claimed addition sequence. Consequently, the cited prior art fails to teach or suggest the claimed addition sequence and the pending claims should be allowed.

IV. The Water and/or Acidic Proton Abatement Limitation

Claims 1, 23, 24, 31, and 64 recite a specific method for abating water, acidic protons, or both from the chromium-containing compound that is not taught or suggested by the cited prior art. More specifically, the independent claims recite:

Claim 1: “abating all or a portion of the water, acidic protons, or both from the composition comprising the chromium-containing compound by contact thereof with a non-halide metal alkyl prior to contact thereof with a composition comprising the metal halide-containing compound”;

Claim 23: “wherein water, acidic protons, or both are abated from the composition comprising the chromium-containing compound by contact thereof with a non-halide metal alkyl prior to bringing the mixed resultant solution into contact with the composition comprising the chromium-containing compound”;

Claim 24: “wherein water, acidic protons, or both are abated from the composition comprising a chromium-containing compound by contact thereof with a non-halide metal alkyl prior to preparation of the catalyst”;

Claim 31: “wherein water, acidic protons, or both are abated from the chromium source by contact thereof with a non-halide metal alkyl prior to formation of the catalyst”; and

Claim 64: “abating all or a portion of the water, acidic protons, or both from the composition comprising the chromium-containing compound, a composition comprising the pyrrole-containing compound, or combinations thereof by contact thereof with a non-halide metal alkyl to form a mixture prior to contact of the mixture with a composition comprising the metal halide-containing compound.”

As can be clearly seen from the claim limitations set forth above, claims 1, 23, 24, 31, and 64 recite the limitation that water, acidic protons, or both are abated from the catalyst components by contacting the catalyst components with a non-halide metal alkyl. In contrast, *Reagen* teaches that the catalyst components are protected from picking up water (or picking up additional water), by placing the catalyst components in a drybox and contacting the catalyst components in a drybox employing nitrogen or using airless glassware employing a vacuum or nitrogen (anhydrous conditions). See *Reagen*, col. 19, line 42 – col. 20, line 12. *Reagen* is silent with respect to methods for abating water from the catalyst components. Thus, *Reagen* fails to teach or suggest that non-halide metal alkyls can be used to abate water, acidic protons, or both from the chromium-containing compounds. The Examiner does not cite *Manzer* or *Furtek* to teach or suggest the

claimed abatement method. Consequently, the cited prior art fails to teach or suggest the claimed abatement method, and the pending claims should be allowed.

CONCLUSION

In commenting upon the cited references and the pending claims, certain details of distinction between the cited references and the pending claims have been mentioned to facilitate a better understanding of the claims. The unclaimed distinctions are not intended to create any implied limitations in the claims. Additionally, not all distinctions between the cited references and Applicants' present claims have been presented by the Applicants. Applicants reserve the right to submit additional evidence demonstrating that Applicants' claims are novel and non-obvious in view of the prior art.

The foregoing remarks are intended to assist the Examiner in re-examining the application and, in the course of explanation, may employ shortened, more specific, or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims. The actual claim language should be considered in each case. Furthermore, the remarks only represent certain advantageous features and differences between the pending claims and the cited references that Applicants' attorney chooses to mention at this time. The remarks should not be considered exhaustive to all features that render the claims patentable.

Consideration of the foregoing amendments and remarks, reconsideration of the application, and withdrawal of the rejections are respectfully requested by Applicants. No new matter is introduced by way of the amendments. Applicants reserve the right to pursue additional subject matter disclosed in the specification by way of one or more continuing applications. It is believed that each ground of rejection raised in the Office Action dated April 19, 2007 has been fully addressed. If any fee is due as a result of the filing of this paper, please appropriately charge such fee to Deposit Account Number 50-1515 of Conley Rose, P.C., Texas. If a petition for

extension of time is necessary in order for this paper to be deemed timely filed, please consider this a petition therefore.

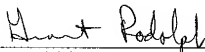
If a telephone conference would facilitate the resolution of any issue or expedite the prosecution of the application, the Examiner is invited to telephone the undersigned at the telephone number given below.

Respectfully submitted,

CONLEY ROSE, P.C.

Date: _____

9/19/07



Grant Rodolph
Reg. No. 50,487

5601 Granite Parkway, Suite 750
Plano, Texas 75024
(972) 731-2288

ATTORNEY FOR APPLICANTS